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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/565,627

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EXAMINER

KALAFUT, STEPHEN J

ART UNIT

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1795

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/565,627	Applicant(s) OHKUBO ET AL.	
	Examiner Stephen J. Kalafut	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-16 and 18-39 is/are rejected.
- 7) ☒ Claim(s) 17 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>24 Jan 2006, 16 Jan 2008</u> . | 6) <input type="checkbox"/> Other: ____. |

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The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1, 5, 6, 10, 12-14, 16, 18, 20, 21, 23-28 and 30-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* (US 6,194,099) in view of Nishimura *et al.* (EP 858,119), both cited by applicants.

Gernov *et al.* disclose an electrode composition that comprises carbon fiber having a diameter between 10 and 1000 nm (column 6, lines 20-24) and a active substance, which is a sulfide (column 8, lines 12-22). Upon reaction with a lithium anode (column 19, lines 23-26), this would become a metal sulfide. Gernov *et al.* teach that the porosity should be “as low as possible”, to maximize the volumetric density of the active material (column 2, lines 60-67). For this reason, the present porosity values would represent a matter of optimization to the ordinary artisan. Although Gernov *et al.* disclose solid polymer electrolytes (column 7, lines 25-31), they do not teach the electrolyte to be contained in an electrode. Nishimura *et al.* teach the inclusion of polymer electrolyte material in either or both electrodes, to permit the “smooth supply of lithium ions” to the active material (column 4, lines 38-44). Because Gernov *et al.* also disclose a cell with a lithium active material, it would likewise benefit from the “smooth supply of lithium ions” between its active materials. For this reason, it would be obvious to include the polymer electrolyte of Gernov *et al.* in one or both of their electrodes, as taught by Nishimura *et al.* Gernov *et al.* also give guidelines for the length of the carbon fibers, and thus the aspect ratio

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(column 8, lines 24-28). Nishimura *et al.* teach the use of lithium alloy as an anode (column 11, lines 1-6) and cathodes that include oxides of Co, Mn, V and Ni (column 11, lines 7-11). Gernov *et al.* also disclose lithium alloys and lithium intercalated carbon and graphite (column 16, lines 56-59) as anode materials and teach SiO₂ (column 23, line 14), carbon and graphite (column 7, lines 3-7) as electrode components. Since graphite is listed, the term “carbon” would be understood as being non-graphitic. Nishimura *et al.* teach polymethyl methacrylate and similar polymers as the electrolyte (column 10, lines 36-39), which would fall into formula (1) of claims 32 and 38. Gernov *et al.* disclose carbonates as liquid components for the electrolyte (column 17, lines 14-17). Nishimura *et al.* disclose ethylene, propylene and methyl ethyl carbonates as liquid electrolyte components (column 10, lines 52-58). Determining optimal proportions for the various electrode components, optimal size and roundness for the carbon filler, and obtaining an optimal electrode density would be within the skill of the artisan. Since the carbon and solid electrolyte within the electrodes of the references as the same as those presently claimed, their ability to absorb propylene carbonate would also be the same.

Claims 2, 7-9, 11 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* in view of Nishimura *et al.* as applied to claims 1, 10 and 21 above, and further in view of Nanba *et al.* (US 2006/0035149).

These claims differ from the above references by reciting that the carbon fiber is graphitic, branched or hollow; that the carbon material includes Si, that the graphite material contains boron; or that the electrode contains tin oxide. Nanba *et al.* disclose an electrode composition including a fibrous carbon that may be hollow (paragraph 0021) or branched

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(paragraph 0023), with an interlayer distance (d002) of 0.344 nm or less (paragraph 0024), which would indicate that the fiber is graphitic. The electrode composition also includes tin oxide (paragraph 0019) and particulate carbon that includes silicon on its surface (paragraph 0015). Because of the high discharge capacity, good cycling characteristics and low internal resistance (paragraph 0013), it would be obvious to use the carbon fibers, carbon particles with Si, and tin oxide of Nanba *et al.* as the fibers and carbon filler of the electrodes of Gernov *et al.*, along with a solid polymer electrolyte as taught by Nishimura *et al.* The recitation of how the graphite fiber was made is treated under product-by-process practice, and would carry no patentable weight until a showing that the process necessarily conveys to the product characteristics not found in the prior art product. See MPEP 2113 and the cases cited therein.

Claims 4 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* in view of Nishimura *et al.* as applied to claims 1 and 14 above, and further in view of Nishimura *et al.* (US 2003/0049443).

These claims differ from the above combination by reciting that the carbon fiber or the additional carbon material is graphitic and contains boron. Nishimura *et al.* '443 discloses an electrode material containing carbon fibers and particles having a high degree of crystallinity (paragraph 0008), thus being graphitic, where the fibers may include boron (paragraph 0036). Because the resulting materials have good conductivity, and confer good dispersion efficiency to the electrode while enhancing its discharge capacity (paragraphs 0140 and 0141), it would be obvious to add boron as taught by Nishimura *et al.* '443 to the carbon fibers and graphite fillers

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of Gernov *et al.*, used with a solid polymer electrolyte as taught by Nishimura *et al.* '119.

Nishimura *et al.* '443 is the equivalent of EP 1,191,131, cited in the PCT Search Report.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* in view of Nishimura *et al.* as applied to claim 1 above, and further in view of Mizumoto *et al.* (US 5,541,022).

This claim differs from the above combination by reciting that the carbon fiber includes an oxygen-containing functional group. Mizumoto *et al.* discloses an electrode composition including carbon having an oxygen-containing functional group, which is used to act as an absorption site for lithium ions (column 4, lines 23-31). Because the cell of Gernov *et al.* uses lithium ions in its electrodes (column 16, lines 56-61), it would be obvious to use the oxygen-containing functional group of Mizuno *et al.* in its carbon materials, such as its carbon fibers, used with a solid polymer electrolyte as taught by Nishimura *et al.*

Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* in view of Nishimura *et al.* as applied to claim 1 above, and further in view of Okada *et al.* (US 6,534,218).

While Gernov *et al.* disclose lithium anode materials (column 16, lines 52-61), they do not disclose lithium nitride as an electrode active substance. Okada *et al.* disclose lithium nitride as an anode active material, used in place of lithium intercalated carbon or lithium metal (column 11, lines 29-36). Because this lithium nitride would perform the same function as the lithium materials of Gernov *et al.*, it would be obvious to use the lithium nitride anode active material of

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Okada *et al.* in the anode of Gernov *et al.*, along with a solid polymer electrolyte as taught by Nishimura *et al.*

Claim 29 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gernov *et al.* in view of Nishimura *et al.* as applied to claim 1 above, and further in view of Armand *et al.* (US 6,085,015).

Gernov *et al.* and Nishimura *et al.* do not disclose an iron olivine compound as an electrode active material. Armand *et al.* disclose a cathode material of olivine LiFePO_4 (column 1, lines 23-29). Because this material would provide and absorb lithium ion, it would be obvious to use the olivine LiFePO_4 of Armand *et al.* as the cathode active material with the carbon fibers of Gernov *et al.*, in place of the cathode materials of Nishimura *et al.*

Claim 17 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art cited either herein or by applicant does not disclose an electrode composition that includes carbon fibers as recited in claim 1, a solid polymer electrolyte, and a carbon material comprising at least 50 mass percent graphite particles with the recited C_0 , La, Lc, BET surface area, true density and laser Raman R value.

The lengthy specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

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The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The references cited as "X" on the International Search Report have been considered. Morita (JP 4-115,776), Frysz *et al.* ("Carbon filaments...") and Nagata *et al.* (US 2004/0043293) disclose carbon fibers, but not the solid polymer electrolyte.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Stephen J. Kalafut/
Primary Examiner, Art Unit 1795